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Interviewee: Crooke, Curtis
Interview Date: October 6, 2001

OFFSHORE ENERGY CENTER

ORAL HISTORY PROJECT

Interviewee: R. CURTIS CROOKE

Date: October 6, 2001

Place: Houston, Texas

Interviewer: Tyler Priest

Side A

TP: This is an interview with Mr. Curtis Crooke for the OEC Offshore Hall of Fame Induction, 2001. The interview is taking place on October 6, 2001. The interviewer is Tyler Priest. Why don't we start at the beginning? Tell us a little bit about yourself, your background.

RCC: I got into it in a rather strange way. I didn't get into the industry through an oil company or anything. I got into the industry, or started on that trail when I was at Berkeley, my senior year at Berkeley. I was majoring in mechanical engineering and hydrodynamics, and I started working on a program that was sponsored by the Office of Naval Research. It was called the Waves Project. It was an outgrowth of some of the problems during World War II with the amphibious landings in the Pacific.

Oceanography had been an old-time business, but it was chemistry and biology and this sort of thing. The Waves Project was really the first one starting on ocean dynamics - waves, beaches. It really started with the landing in Tarawa [Kiribati Islands], which was a turkey shoot, when all the amphibious craft landed on a reef and got stuck and hung up, and they didn't know the reef was there. And so, it was a business of trying to get

smarter in understanding what was going on with ocean waves and wave forecasting.

TP: Is this when you built the big tank? You had a big tank that you . . .

RCC: Oh, we have had several. But anyway, out of that project, I got started in ocean waves and beaches and breaking waves. And in that project were several of the people I have seen in some references that were outgrowth . . .were there at the same time, was Charlie Brettschneider, who was the one you cited before for wave weather forecasting. Jack Morrison with the wave forces on piles people. But, at any rate . . . Bob Wiegel . . . there was quite an alumni that came out of that project in the 1940s and about the middle 1950s. So, I was working on breaking waves and wave forces on objects and wave tanks.

TP: You said this was sponsored by the Navy?

RCC: Yes, it was primarily sponsored by the Office of Naval Research, ONR. Along the line, we did pick up some research money from several of the oil companies. I remember Shell . . .Exxon, we had some money from earlyon for wave loads, and primarily, we had money out of .

. . Signal Oil and Gas no longer exists anymore. I am not even sure what happened . . . Signal is still part of Allied Signal, but I think they completely got out of the oil business. But I was doing work for them on, again, forecasting wave loads on piles, which was interesting because down here in the Gulf, they were building these pile structures, but really didn't have much data on them. There was an old article written by one of the Army engineers back in about 1912, and I think everybody was designing based on his stuff!

TP: Now, this was in the early 1950s?

RCC: 1948, 1949, 1950, 1951. Anyway, Signal Oil had us working. They had a chief engineer at Signal, Garth Young. I used to do work for him. He convinced me to get out of the academic business and go get where the money is going to really be in the offshore, go find the oil business. But his advice was, "Don't go to work for an oil company. Go to work for someone who is going to build this stuff and create it."

So, he got me an interview with a corporation called Macco Corporation. They were there in Southern California. They were a heavy construction company. I mean, they were partners in building dams and airports

and pipelines, and they had an oil field division which is where the oil companies . they had rig builders building derricks and putting them up and down, and infield pipelines. And also had a drilling mud division selling Barite. So, I went to work for Macco Corp. and Maceo Corp. didn't even really know what in the world they hired me for because they hadn't gotten close to the ocean in their life.

Out of that, we put together a joint venture with Stone & Webster Engineering out of Boston, and then became the contracting engineers for the CUSS group, which was the old Continental, Union, Shell and Superior, from which Global Marine eventually grew out of. And so, we did the engineering and design work, and field supervision kind of work for the CUSS group, because the CUSS group was primarily all petroleum engineers and geophysicists and whatnot, and we were this Macco Corp. and Stone & Webster none of us had any oil background at all. So, at that time, the CUSS group were running several seismic boats and they were running a boat called the Submarex, the Submarex being a 173 feet Navy patrol craft.

TP: Was that the rig over the side?

RCC: The rig over the side. Absolutely. We were core drilling. And, of course, as the CUSS group came along, they were getting interesting in doing more than just drop coring and dart coring type for bottom samples. They wanted to drill deeper into the ocean floor.

So, at the same time we were working on platforms and platform designs for the CUSS group, we started supporting the Submarex, doing some equipment-type things and improving the mooring gear. And it was coming along pretty well. I mean, we got down eventually so we were putting bases down and putting surface strings. But we didn't have a metal riser to start with. The first thing we had for returns was a Regan Corp, bag type preventer on the top. We had diverted the flow up a hose back to the surface.

So, we were coming along with that pretty well. The platform business on the West Coast was so different than the Gulf because it was deep. I mean, you could hit a golf ball to 500 feet of water and places along the California coastline. So, it pretty soon became apparent to the CUSS group that they really weren't that interested in platform-type solutions. They were really going to face deeper water kind of problems very early.

We did do some work on some early platforms. The CUSS group had the patent from a Theodore Kuss. If you remember, the radar towers that were strung out along the East Coast of the United States for early warning? I don't remember now if they were four-legged or three-legged but they were designed to be built on their side, floated out horizontally, upended, much as being done in some of the stuff in later years. This was back in 1952, 1953, 1954. They had a disastrous failure with one of those KUSS platforms up off Cape Cod, I believe it was. It was in several hundred feet of water. Their problem was in order to get the structure out and to get the deck up, they left some of the top bracing out. The top bracing was going to be hinged and then brought up after the deck was in place. But, at any rate, in a storm, that bracing got wrecked and broken off, and so was never reestablished properly. And that whole platform did fall down.

At any rate, the CUSS group, Stone & Webster, Maceo - we all got very disenchanted with the platform business pretty early on. And then they started looking at improving the next thing up in size from the Submarex. They started thinking about something you could really drill a hole with blowout preventers on the bottom and have enough mud and drilling water capacity . . . looked

around and eventually it turned out to be the CUSS I which was a 250-260 feet YFNB, non self-propelled. It was a surplus Navy yard barge that was used during the war as a supply barge. Several of those hulls were used down here in the Gulf of Mexico as tenders. One of them came to a drastic end with the gas explosion.

TP: There were a lot of them, because the early platforms were tender supported.

RCC: Yes, were tender supported. It was the same basic hull on several of them. The others were the LSTs which became much more popular down here.

TP: And the CUSS I, you drilled through the center?

RCC: That drilling over the side was for the birds! The Submarex was bad . . . it only had about a 24 feet beam. I mean, she was narrow, fast, when the Navy had it. When the pipe got stuck, you couldn't pull very hard because, I mean, the rig would just lean the vessel over and put the gunwale awash. So, when the pipe got stuck, we would get this thing to dynamic . . . purposely get it to rock, pull it down one way, then release the break and let her swing this way. Then pull like mad and bring her back. You could get some real velocity going and then slam the

brake on and jar it. More than once, we had ships that would travel up and down the coast and would come off their course to see whether we were in trouble or not! You'd see on the horizon the flat bow of this ship going whomp, whomp, whomp. So, we had no intention, once we ever got through with the Submarex, to drill over the side anymore, although the Submarex stayed in business. We used it . . .gee, I don't think the Submarex was probably retired until the late 1960s, I think.

We got a job in the late 1950s . . . it was in the same time period that the Andrea Doria and the stockholm sank out in the East Coast. They had sunk an ore boat in Lake Michigan on Thanksgiving Day. It got into a storm and ballast was light . . . they lost 35 or 36 crew members on board this thing. And it was in 400 feet of water off Beaver Island. U.S. Steel owned it. It was the Michigan Limestone Division of U.S. Steel. There was a big lawsuit being generated. They were trying to find the vessel and they hadn't found it. And they had heard at that time that . . . I don't know from how they heard it but they had heard that we were running underwater television on the Submarex. By the time this job came around, we had the CUSS I going. Anyway, they came out and wanted to see this underwater television. I turned the switch on and let them see the wellhead. So, they

hired us on the spot to take the Submarex from the West Coast back through the Panama Canal to Lake Michigan and we did. We managed to find the wreck, photographed it entirely. That was well beyond diver depth in those days. I mean, 400 feet is nothing today but this was 1959, 1960, maybe somewhere in there.

So, the Submarex then went on and did some drilling for one of the Canadian companies for gas well in Lake Erie. Put a few down. And eventually, I think, she did some core hole drilling all through the Great Lakes for the University of Minnesota. Jim Zumberg went on to be president of SMU and then eventually to usc. At the time we worked for him, he was a geologist at the University of Minnesota.

The Submarex was brought back to California, although I don't know why we spent the money because I don't think after it came out of the Great Lakes, we ever used her again. She was eventually cut up for scrap. Somewhere, I've got a picture of it half cut apart in some Japanese scrap yard!

But in the meantime, the CUSS I was coming along. I mean, the CUSS 1 . . . everything since then turned to this global business. You have probably heard that

story.

TP: Yes, I have heard bits and pieces of it. Tell us about your work on the CUSS I.

RCC: I was one of the design engineersand construction superintendents of their advisors or workers. I was, again, working with Stone & Webster and Macco. We were still contractors to the CUSS group. Bought the rig down here in the Gulf and had it towed out to Los Angeles Harbor, Terminal Island. There used to be a shipbuilding company, a pretty small operation called Forrester Shipbuilding. We gave the contract to Forrester to do the conversion. Stone & Webster, Macco, did all the drawings, engineering and whatnot for the conversion. As a matter of fact, I still probably have the only complete set of drawings for the old CUSS I.

So, we put a hole down through the center of it, so we could dri11 through the middle. Boy, in those days, that was a lot harder engineering because you didn't have all these nice finite element computer programs in order to figure out how to stiffen that hull up. We worried about square corners and things of that sort. We had this very teardrop-shaped moon pool in it, spreading the load through it. Of course, the old hulls worked and so the

substructure that stuck up above which supported the rig and the derrick, and that was made so it could grow and shrink . . . it sat on plates, LubraSOL-type plates, so they could work, the hull could work underneath the substructure. The rig was mechanically driven. I mean, it was all chain drives just like a land rig. It wasn't diesel electric at all. It had bulk mud systems on board and bulk cement systems and drilling water, all West Coast kinds of things. A lot of the closing units were all Hydril. I mean, we had never heard of .

TP: It wasn't dynamically positioned yet, was it?

RCC: No. It was strictly a six-point mooring system.

TP: And later added dynamic positioning to that?

RCC: On a short program, yes. The dynamic positioning did not stay on. This one was out. We got it going. As a matter of fact, we designed our own derricks which is probably a first for anybody. I mean, AMSCO and these guys, Moore, they couldn't understand what we were doing designing our own derrick but we did. And it was only a 90 feet tall derrick and we were handling doubles. We made a pipe racker, probably the only automatic racker which Global used for years. I guess it is all gone. I

don't think they use them anymore at all but those little vessels . . .we were really concerned about stability and windage on them so we laid that pipe down.

So, the CUSS I went out and they were doing core hole work along the southern California coast up as far as Conception, the San Diego area. And drilled quite a few holes for quite a few people. Let's see . . . she went north of San Francisco once for Shell. I noticed in some of your literature, one of the guys at Shell was talking about the Mobot that they used on . . .

TP: Howard Shatto.

RCC: I can remember watching that Mobot drown one day when it was down on the bottom, and you could see the water crawling up the lens before it finally went out.

TP: It was an interesting thing. It was hard to perfect. I interviewed one of the divers. I think it was Lad Handelman. He said, "The Mobot gave us more work than anything!

RCC: Well, that was another interesting thing that came out of way back in the Submarex days, where the early divers got in the offshore business.

TP: Yes, especially California because . . .

RCC: That is where most of them came from. They were Abalone divers! They all came along out of the Santa Barbara, Moro Bay area in Abalone diving, well outside of Ventura, and they really grew with the industry, I'll tell you. Blackie and Lad.

TP: That is interesting.

RCC: So then, the history of the whole thing went . . .we kept the CUSS group going until about 1956 or 1957, when there was a bill passed in the state of California, the Cunningham Bill, and the Cunningham Bill said that anything after such and such a date in California's tidelands was going to be structures. And preferably, land filled structures. And, as far as I know, there was only one ever built. Well, all of that stuff in the city of Long Beach sort of fell into that but there was one about 10 miles north of Ventura. I think that was Arco that had that, or Richfield at the time. They built that Rincon Island out there.

TP: With the fake facades and all that?

RCC: Yes, that was in that big long causeway. That was as

best I know the only structure that was ever built under the Cunningham law in the state of California. The other participants in the CUSS group, all of them took a look at it and said, "Well nuts, we are not interested in building that kind of stuff. It doesn't make any economic sense." So they were going to cut the whole mess up and junk the business. And then, primarily Bob Bauer, I think, was the real one who had the stroke and the smarts behind him to get Union step up and buy the other three out which really meant pay CUSS I because that is about all that we owned. Well, we still had the Submarex and those two other seismic boats.

So then, they formed . . . actually, it was first called Global Marine Exploration Company, and it was owned 80% by Union and 20% by some of . . . when they broke that up after the Cunningham Bill, I left stone & Webster, Maceo, and I went into the consulting business for a couple of years. I was consulting right back to Bauer, Field and Stratton, and I was kind of keeping those rigs going.

TP: Then you went . . .

RCC: When they really got the thing [Global Marine) formed in 1959, I then joined them as an employee. I had first started to work for Bauer in 1952, I think, the end of

1952 or the first part of 1953. I didn't actually become his employee until 1959.

So, they split up and eventually, they got rid of Union because we were then drilling for Chevron and a few other companies on the West Coast . . .it wasn't too great that we were owned 80% by Union Oil. So, we got Union out of it and got some other people into it. It was Aerojet General which was sort of a strange thought. But eventually, they reneged on a deal they had made with us for some financing and so, they got rid of Aerojet General and went back onto Wall Street, and got some outside . . .The Witneys, White & Weld, Henry Hillman and those people then became stockholders and really controlled . . .

So that sort of gets you through the corporate business. Eventually, when we got with the people on Wall Street, we got rid of the name Global Marine Exploration, and it was just Global Marine, and they got on the New York Exchange. The corporation has grown from there, although I understand now there is talk of Santa Fe and Global Marine merging.

TP: There have been so many mergers in the drilling . . . I can't even keep up with it.

RCC: Well, they might as well merge the drillers because the oil companies are merged, too. There are fewer and fewer customers out there. It is interesting because Santa Fe was an outgrowth of Union Oil the same way essentially Global Marine was.

Santa Fe was the land drilling arm of Union. Johny Robertson, Ed Shannon . . .I forget exactly who those early guys were. But the connection was that when we went offshore, we had a bunch of abalone divers and we had some ship captains and things like that, and ship engineers that we were trying to turn into drilling people. And so, we got a lot of drilling experience that was lent to us from Santa Fe. So, a lot of them . . . gee, I remember the first guy I ever really learned anything about the business from was one of their old superintendents, Leo Goss. Leo is probably long gone by now. Leo was quite a character, and really one of them that should be remembered. So, it would be interesting if Santa Fe and Global get back together again to sort of close the loop 40-50 years later.

The CUSS I was still doing its work. By then, she had full blowout preventers on the bottom. A television and guidelines and risers and slip joints, and flex joints.

TP: Were you yourself working on all aspects of the . . .

RCC: Oh, yes, in those days. Up and down. We got companies like . . . I've got to keep straight between old Benny Rinehold in Varco and Huntzinger and Ventura Tool, which is now . . .they were bought out by somebody and long gone. We got them interested . . . they were already in the oil business on land up in the Ventura Canyon up in there, and had a machine shop. Gee, they had a great old guy there that was their chief engineer. We could get him 24 hours a day, 7 days a week. He would make stuff that they had to repair and they would conjure up new things.

Little things like flex joints. God, they went through all kinds of additions of what a flex joint ought to look like. And we got pretty good at it. And, at the same time when we were out there sort of screwing around in a vacuum ourselves, the big one back here that was doing work was Shell.

TP: Yes, the Bluewater . . .

RCC: The Bluewater Well, yes. Somewhere along that line, they put together that engineering conference.

TP: The Million Dollar Conference?

RCC: Yes. I don't remember . . . of course, we got in there for free because we had the patents.

TP: I think it was January, 1962.

RCC: I think that is probably right. I was going to say the early 1960s.

TP: Maybe 1963. 1962 or 1963.

RCC: Well, that was a big milestone because now, all of a sudden . . . they gathered up a lot of data from a lot of people, so a lot of stuff got laid out on the table where everybody was. Up until then, it hadn't. It was everybody was sort of doing his own thing here and there.

TP: That was a real watershed.

RCC: It was a watershed. There is no question about it. It sure helped the engineering business and the development of the industry. Of course, I guess by then, Richfield had built what they called the Rincon. That was an LSM. A converted Navy LSM. Humble Oil had built SM1. That was another LSM. They were both the same hulls .

slightly different configurations on board. They both did some coring work and drilling work off the California coast. Global Marine eventually bought both of those and owned both the Rincon and the SM1.

It seemed to me there was a third one of those around but I can't remember who owned it or what the name of it was. So, there we were, Shell was working down here, we were working out there getting the CUSS I so it could actually drill a decent hole. By the time . . . you say Shell was 1962 or 1963?

TP: The Bluewater 1 and the Rudac system, the subsea system, they started working on that in the late 1950s. And they got it ready for the 1960 lease sale. But they then brought it out to the industry in 1962 here.

RCC: By then, I guess we had taken that Mohole contract with the CUSS I because we did that in 1959 or 1960.

TP: O.K., so you were part of the Mohole?

RCC: Yes.

TP: I guess the CUSS I was going to be the ship?

RCC: Well, that was the first phase of what was eventually going to be the Mohole project. This was done by the National Academy of Engineering by the AMSCO Committee.

TP: We had a whole chapter on that in the Brown & Root history.

RCC: Don't tell me you've got Bill Bascom in there! He was with me on the Wave Project at the same time.

TP: I know that is a sore subject for Global Marine.

RCC: Well, yes, it is mostly all . . .

TP: All Brown & Root, yes.

RCC: Well, no, I mean, even that early stuff that Bascom did. I mean, somewhere along the line, he said he took a bare boat charter on the CUSS I. He never had any bare boat charter on the CUSS I. We manned and operated the whole thing from day one.

Another guy that was with Bascom in those days was Ed Horton, the guy who now has the Spar Buoy deepwater production system. Ed worked for me from 1975 to 1985,

some thing like that. But anyway . . .

TP: So, CUSS was put to work on the Mohole?

RCC: Yes, we weren't the only rig around. We went out in about 12,000 feet of water, down off Guadalupe Island off Mexico. And for that case, we did dynamically position the CUSS I. And put four Murray Turgether big outboard diesels on the sides of it. It was a pretty rudimentary kind of a deal but it worked. The control system was not very sophisticated but Bauer liked to tell the stories about all these electronics. We were actually positioning with Sonar. Instead of the present day Sonar pinging on the bottom, we had suspended some buoys about 200-300 feet below the surface, taut wire line buoys, so they didn't move very much. And from the top of those buoys, we had spar buoys with flags on them that pierced the surface. And so, these guys had all this radar, having the sonar going on all those electronics, and all the guys who were manning the station up there had grease pencil marks on the windshield, and they would just keep the flags on the grease marks . . . I mean, that is partially the story but it was pretty good. They did most of it that way because electronics had a lot of troubles.

But yes, we drilled, I forget how many holes down there and got to maybe about 1,000 feet penetration. We had no

reentry at that time. I mean, it was a single hole and drill as far as you can and circulate basically salt water, and they would spot a little mud here and there. At any rate, that worked fine. I mean, they got what they wanted out of it.

It did start, from an engineering standpoint, it did get a little smarter on the dynamic positioning which I know Shell claims they invented with Eureka or something or other.

TP: That is what Shatto worked on.

RCC: Yes, well, that was that taut wire line system of theirs which really came out of the Navy at Caltech in 1942 but that is another old matter! Nevertheless, they applied it to that and it worked. As they would tell you, it has limitations with the currents and the slope of the wire and all. So, with the CUSS I, we went that sonar pinging not off the bottom, off the buoys and the other thing that we really got out of it was starting to take a look at pipe stresses.

TP: I know that was a big part of the Mohole because you were going to drill down so far.

RCC: Well, that is right. And, of course, the big problem is, it is like if you take this, if it is loose, you can make nice radiuses with it. You tighten it, you bend it, and you get sharp radiuses in high stress. So, you had to do something to control the bending stresses because the ship rocked and rolled, and that is where we first built the first one of these horns like on the end of a trumpet, to control the radius that the pipe can go to, and you choose that radius both for the size of the hole in the ship, as well as what the pipe is and what it can stand. So, that was the first use of that. And we really started to take a look at drill pipe and drill pipe stresses. It came in very handy when we eventually did get the work with the Challenger and tangled with old Arthur Lubinski over some of that.

TP: Do you want to move on and talk about the Challenger?

RCC: Well, of course, we got through with the CUSS I and then started in building some new ships, and built the Glomar 2 was the first one. That was not too much bigger than the CUSS I. The CUSS I was about 3,500 tons. It sounds like toys. I think the Glomar 2 was about 5,000-5,500 tons total displacement, or something like that. And it originally had a customer for Shell Oil. We were going to make it self-propelled, so we put in all the skags and

the struts and all that stuff. And then they decided they didn't want to self propel. Then they decided they wanted to take it to Alaska, so we did self propel it eventually and it became the first self-propelled drilling vessel.

By that time, I had hired John Graham who I think you have talked with or had honored last year on the drill ship business. And if one goes back and looks where the sort of basic design of the Glomar 2 class came from, John, when he was with . . . they designed a tender for the Persian Gulf called the Howard S. Cole. And the CUSS 2 was very, very close to the design of the Howard S. Cole. It's got a little fuller bow and stern to it. But anyway, so in those years, the 2, 3, 4, and 5 were built. And then we went on and converted those three steam ships which was probably a big mistake in some respects but in another respect, it was right.

The way we got into that was one of strictly money. The company didn't want to spend too much dough. They didn't have it. The industry . . . the day rates wouldn't support it. Yet, I was absolutely convinced we needed larger ships, more tonnage. Had to get bigger. We couldn't keep floating around out there and compete around the world with these little 5,000 ton things

because, I mean, you had supply boats bigger than that! And so, those three ore boats which we converted, they were about 10,000 tons, 9,800, I think, or something like that. So, they were the next step larger.

We started to get some mass but the idea of using steam power was a mistake! Out of the three of them, only one of them was successful and one of our guys told me it was going to be a horrible mistake because these guys wouldn't take care of them. And he was right. We only had one chief engineer in the years of those steam vessels, that kept that one working in perfect shape. He knew how to handle it and he knew how to keep feed water clean and how to take care of a boiler. The rest of them were diasters. They all eventually got converted to diesel electric before they got scrapped.

But they did make the step up in size and after those, then the industry started to go and people were working around the world. And Global needed more ships. I don't remember what we called the next class but it was Grand Isle or something. That was a little over 10,000 tons. Out of that came the Challenger, which gets us up into about 1965 or 1966, I think.

In the meantime, the Mohole Project, after our first part

with the CUSS I off of Mexico, they had gone out for a bid for a contractor to design this great big glorious ship that was going to drill the Mohole. And, of course, we bid on it along with some other contractors. And lo and behold, who got the job but Brown & Root? Did Brown & Root know anything about what they were doing? No, not a bit! As a matter of fact, it was really sad because if I am not mistaken in my memory now, Global Marine, Aerojet General and Shell Oil bid together. And we offered a ship that probably would have done the job, you know, but they were going to give it to the government for a dollar a year. Shell wanted it when the job was over. But it didn't make any difference. It went to Brown & Root. And, of course, Brown & Root didn't know what they were doing and they spent money . . they spent almost $100 million, I think, as the thing got close to close, and about all they really had to show for it was a great big huge draw work and design with National Supply. And somewhere along the line, they eventually called us in to take a look at what had been done. Was there anything you could salvage? Honeywell had done an analog dynamic positioning system for the ship. I believe it was either finished or not quite finished. And our feeling was no, there wasn't anything you could about it. There really wasn't much you could salvage out of where they were. So the thing got shut

down. And I don't remember how long after that was they then decided to change the program and quit trying to go for the whole great big discontinuity itself, to go out and start doing a lot of core holes, do some decent coring, and do it all over the world in the big ocean basins. So they then came out with a competitive bid for a ship to do this.

TP: This is the National Academy of Sciences?

RCC: Yes, the National Academy of Sciences. The first thing had been done by AMSOC. The middle stuff with Brown & Root, I think, was the National Academy of Sciences. They had done . . . the last contract was also the National Academy.

Anyway, we bid on it and we used this last class as Grand Isle class to jazz it up a little bit. Took out some of the drilling things that you didn't really need to do the kind of drilling they were going to do. We put in a short baseline dynamic positioning system. Used tunnel thrusters using the two main screws and what did we have? Two forward and two aft, I believe, tunnel thrusters. We put in six hydroforms down through the center well, of which you needed three. And used the short baseline system. We put on, at the same time, the existing analog

system that the Science Foundation had left over from the Brown & Root contract. And then put in our own . . . I guess General Motors did that. We had a digital system we put in. One of them would fill this room. The other one would fit on the table, but we never did use the Honeywell analog system at all. I don't think we ever fired it up.

TP: This became the Glomar Challenger?

RCC: This was the Challenger, yes. It was built and designed as the Challenger. There were three or four of the Grand Isle or Grand Banks and something or other else. There was three of them. Then the fourth one of that series was the Challenger, and it was built specifically for that job, for that contract. And I believe that contract lasted for 15 years, I think.

TP: It was Global worldwide drilling core and all . . .

RCC: Yes. We didn't start out with reentry in it. We tried to get them to do reentry and I don't think we put reentry into that thing until after the first year or maybe two years, where you could actually pull the bit, change the bit and go back in the same core hole, which I think, if I am right, we successfully did in about

22,000 feet of water.

TP: I have a note that says the cores are covered from 4,300 to 23,000, and were added to, I understand, plate tectonics.

RCC: Tectonics, yes, and that is really where the real final proof of plate tectonics came from - the core holes that came out of the work the Challenger did. As far as I know, at the end of 15 years, they rebid that job and I don't think we even bid on it. Sedco or somebody got it. It is still going, I believe, although it hasn't had much publicity in recent years. But the Challenger, the dynamic positioning worked pretty well. We had some problems getting it started, getting the bugs out of it. It cost us a fortune because our contract was we wouldn't go on day rate until it had stayed 72 hours hands off, don't touch a thing, in a radius of 5% of the water depth.

So, we were out off in the Gulf of Mexico a couple of hundred miles. We would go along and that thing would be just fine, you know. It was getting close to 72 hours and all of a sudden, every engine on that thing would rev up and she would take off for the horizon! Just get her back, start over again. Never could . . .it took us

days to find out what the problem was. I think we had so many people on board out there that we rented the Eureka from Shell so we could berth people on it. We finally found out some programmer . . . that was back in the days when you programmed with punch tape . . .

TP: Punch cards. Yes.

RCC: Well, you had cards originally, then put it on a tape which was a bit faster. I've still got that roll of tape that is about that big around, and cost us about one-half a million dollars of day rate! And some guy, he had put in a diagnostic program that only he was aware of. And when certain things happened, the displacement was divided by zero time. Well, of course, that is infinity. You know, so the poor old thing would take off, even though it had a cursive filter in there which was trying to store about 10 points at a time. When it hit infinity, it didn't make any difference what the other 9 were. I mean, you saturated and off it would go . . . he came to me about two o'clock one morning and handed me this old roll of tape and said, "It's over. It's finished." And it was. Never had any more trouble with it.

The drill pipe, again, we learned a lot about the drill

pipe stresses. I use a very sharp guy out of Caltech now, a Dr. Thad Vreeland, and he really got down to analyzing and understanding the stresses in the drill pipe. He actually wound up using intermediate rubbers along the space. You wouldn't necessarily have to do that if you could have had a larger radius in the horn, but the horn radius is limited by the size of the ship you are in. So, for that condition, you couldn't stand the knob of a tool joint, and then the middle of the joint bearing against the horn. I mean, you've got a high stress in the upset, so we put rubbers on that.

I remember Arthur Lubinski thought we were crazy. The pipe wouldn't last. You wouldn't drill two holes with it. The stresses were too high. And so, before it was done, the deal we made . . . we made money off of Arthur because we made a deal with the Science Foundation. They were very, very concerned about his analysis. We said, that's all right. We'll take the risk. We'll buy the pipe and we'll day rate the pipe to you. And they had agreed to day rate it at very few days to pay off it because Arthur had convinced them it was so risky. And I don't think, in the 15 years, we ever broke or fatigued a piece of that pipe. We dropped some pipe but it was almost all human error here and there. Slip troubles or something.

Of course, on that job, we started using double elevators because we were using high strength steel in the pipe. I can't even remember the designations of that stuff any more but it was essentially HY120 or some other steel. And so, you really couldn't stand slip notching and whatnot on it. So it was double automated and double elevators on it. And it worked fine. It was going along. And, of course, it was an outgrowth of that that got us started with the Explorer.

The government came to me . . . it was interesting. They were brothers. One of them worked for a company here in Houston and one of them worked for the CIA. And through the brother here in Houston, they heard about what we were doing and had done, so they came to us to see if we could do that problem.

TP: Are you talking about the Jennifer Project?

RCC: Yes, the old Explorer, yes.

TP: Can you say anything about that? It is such a fascinating and famous incident.

RCC: It is a very interesting problem because you never reallyknow what to say about it. The program, as far as the

federal government is concerned, is still classified. However the government, at the same time, has obviously disclosed to the Russians or the Soviet Union what was done because we did give them back the flags and the videotapes and whatnot of the burial at sea of the bodies we recovered. So that was given to the Russians. And that was quid pro quo for getting the black boxes from the Korean airline that the Russians shot down off Japan, I guess that was. That is how come we got our hands on that black box. They wanted the stuff on their sailors and we wanted the black box. So obviously, the Russians knew we had done something. And later on, for some reason or other, the U.S. government gave them the ship's bell off the submarine, but I never did know what was traded for that.

TP: What year was this again?

RCC: They first came to me in the first week of November, 1969. And we hid the Explorer . . .

TP: The U.S. government, the CIA?

RCC: Yes. We had the ship on sea trials by July of 1973. And we were starting . . . they had some data. They had some pluses and minuses when they approached me, and I say

"me," because that is the first guy that came to it, was Global Marine. They were after everything that Global Marine had accomplished, not myself. But they've got to start with somebody on clearances.

They had a lot of data on the wreck itself, and it had all been photographed and pretty well analyzed so they knew what that was about. But they also had a great big, thick green book that had a bunch of companies in the United states that they had dealt with and worked on to try to come up with solutions. Well, the first thing they had us do was go through all this green book and shoot down why you couldn't do any of this stuff. I mean, it took a long time. At the same time convincing them that the way to do it was just pain old brute heavy lift. Just get after it. So, we started in November 1969 and by the end of summer of 1970, we pretty well had an agreement on the scope of what this thing was going to be and how you were going to do it. And got approval from them at the end of 1970. And engineered that whole thing. Got it all built and were on sea trials by 1973.

Again, I get back to pipe. The biggest technical problem we had or were close to having with that rig was the heavy lift pipe. Now, that pipe is an essentially modified navy gun barrel material. I think it was in

three ODs . . . the bore down through the center was a constant six inches. We had three tool joint sizes and

End of Side A

Side B

RCC: . . . and we gave that contract to manufacture the pipe to National Supply in Torrance because they had been building the gun barrels or a lot of the gun barrels for the Navy. And man, we hit disaster right away. We could get those things forged, we could get them tree panned but with the heat treat, it was nothing but cracking. We just stress cracked that stuff. We had that pipe sitting around like telephone poles. And finally had to really do something, so we got with Jorgensen Steel up in Seattle, right next to the Boeing plant, and gave them a contract, got some other U.S. metallurgists involved, most of which I discovered is really black magic, not a science. We had about rebuilt half a plant for Seattle. Jorgensen got a new heating plant. What the problem turned out to be was the naval gun barrels, they were forged as sort of a straight barrel with a lump on one end where the breech is going to be machined. Well, our pipe had a lump on both ends, where the male and female part of the tool joints were. And so, it was just a whole new brand new trial and error business and some new quenching tanks to be able to handle the big lump on both ends. Eventually, we got it done but it was a real pain for a while. It was not obvious what the solution was. But other than that, it had a lot of interesting things

in it.

The ship itself which was big . . . I mean, there wasn't an awful lot brand new in it. It was just everything was bigger. I mean, like the hydraulic system of 12,000 horsepower. We had 30 inch mains at 3600 psi working pressure. Everything was just huge! And again, the pipe stresses were a problem. Again, we had no horn in it because we had to bring things up, so we had to gimbal the whole rig floor. I mean, the rig floor, the derrick, the whole thing was heave compensated and gimbaled. This is good for about 24 million pounds or 12,000 tons. It was just big. Those big heave compensators - the barrels on those things, there wasn't a manufacturer in the United states who could do them that large, so all those ring forgings came in out of Japan. The bearings that the gimbal ran on were all made in Germany. We had nobody in this country who could build anything that large. You know, the rest of it was . . . every piece of that pipe was proof tested at 24 million pounds. At that time, it was the world's largest tensile testing machine. It may be still. The Russians had one at about 12 million. I don't think we had anything over about 5 or 6 in this country.

TP: And so, you had to recover the submarine in pieces?

RCC: Well, that is always interesting. As I say, it is 25 years later. The government is supposed to release this stuff.

TP: I suppose that would be another five years. They will have the 30 year rule and they can . . .

RCC: Well, what happened, as I understand it . . . it is sort of known as the Global Compromise. And what the U.S. government has done is while they gave them the flags and everybody knows this job was done, the U.S. government has never officially admitted that we did anything with their submarine. The other direction is the Russians agreed not to make any diplomatic complaints about it because it is stealing. I mean, the property of a military vessel always remains to the owning country. There is none of this abandoning these ships out at sea. That doesn't apply to military equipment. So, there was a compromise made. The U.S. government will never admit we did it and the Russians will never complain that we did it. So there the whole thing stands.

TP: Just searching for manganese nodules.

RCC: Just searching for manganese, which we had done legitimately. We had done some manganese nodule work and

we had done some polyphosphate, which we had done for Collier Carbon and Chemical, the phosphates for fertilizer P205 off west of San Diego.

TP: With the Challenger, or the Explorer?

RCC: No, this was even before. This was back in the 1960s when we had done that. We had done some manganese nodules for, I think it was Kennecott. At any rate, they exist. There is no question. The economics doesn't make any sense. You can get them up and that is not the problem. The problem is the form of that stuff is the processing cost on it. What you want is the manganese nodule for the nickel and that nickelatorite can't compete with the nickel sulfite out of Canada. And so, you can do all the studies you want about how many dollars a ton it is going to cost you to lay it down in some port in the United states or the Philippines or somewhere, and that is competitive but you can't process the stuff.

So, the Explorer . . . and, of course, the Navy . . . Global Marine rented that from the Navy. It has a 20 year lease on it, converted it.

TP: Is there anything else that you want to move on to after

the Explorer? I notice in your form here, topics of special interest you would like to discuss. The rig hands that make it all happen.

RCC: That is right. I hope that you guys in the history somewhere along the line go back, particularly in the day when I was playing in the game because we were only half-smart and things were crude, and those guys were out there busting themselves to make this stuff work, trusting in what we were doing.

I remember one time, we had broken a lifting tool down off the mouth of the Mississippi down there. We dropped a stack in about 300-400 feet of water. We got it back. One of the J slot tools that had been made by Varco . . . heat treated it anyway . . . I was convinced in looking at it that there was nothing wrong with the tool. It was the driller's error. You would put the whole thing in the compression and it bent the string and broke the tool. But now you've got to pick this stack up again and use the next one that is sitting on the rack and one just like it which was O.K. except when the stack wouldn't test on the stump. So now, you had to lift the thing up, get it underneath this stack and change the ring on it. Well, here I am sitting here with these guys . . . I've got to stand under there with them wondering, is this

thing really right or not? Is that son-of-a-bitch going to break or not? It didn't .

Those guys . . .I mean, not only the rig hands, the marine crews, the whole bunch - the spirit of those people was just tremendous. You didn't find it elsewhere in the industry than in the United States. They were almost self-policing. The guys who didn't work, they ran them off themselves. You didn't have an awful lot of squabbling on those rigs. I am speaking for the rigs that we had and I suspect it was the same down here in the Gulf of Mexico because we got a lot of people from here and a lot of our people, you know . . . eventually, it started going back and forth. I hope they aren't lost. I mean, you can talk to a lot of guys like myself or something or other, but there are a whole stream of people out there that made this thing happen.

TP: You can draw it up and drawing it up is one thing but making it work is another.

RCC: Oh, yes. You can write instructions and the whole procedure but if these guys don't do it or can't do it or won't do it, it isn't going to work. I think, gee, we took that old Glomar 3 and we took it down the BassStrait for Exxon, between Tasmania and WilsonsPromontory

there in Australia. That is one of the roughest, miserable places in the world. And we are down there with that little Glomar 3, and those guys, they made it work. Just frightening.

TP: I mean, it is important to keep in mind that a lot of the innovation happens on site.

RCC: Oh, absolutely. These guys had the ideas. The other one that we shouldn't lose track of either was . . .I don't know if it is still . . . it's been 15 years since I have been around the business . . .that is the suppliers. An awful lot of the suppliers did a lot of work for the contractors. You know, the Camerons, the Hydrils, the Koomeys. Right down through the whole mess of them.

TP: We talked to Paul Koomey this morning.

RCC: He and I had a fight at one time or another! The other one was one time, Global had this guy, Burlenson, who wrote, I think, the Jennifer Project, and he came back and was writing a book on the . . .I thought he was writing a book on the offshore oil industry. It turned out he was writing a book on Global Marine.

TP: Right. I have seen those books.

RCC: Well, I gave him something that I wish somebody would get back, and that is I gave him a whole stack, hundreds of business cards, from some of these old guys that were from the old supply companies.

TP: I should track him down . . .

RCC: Well, I tried to convince him to do it when he was writing his book on the oil industry, to use it as the front piece, or when a chapter ended, if you had some blank pages, just plaster these business cards in there, and guys would get some recognition, you know?

TP: That is too bad that those have been lost.

RCC: These guys like Herb Wilkey and Glen Webb and just a whole mess of those guys. The Huntzingers. Benny Reinhold. Gee, the work they did.

TP: Would you know how to track any of these people down today?

RCC: Most of them are dead I think! There is that whole end of the business that shouldn't be lost. But old Burleson is sure to have these cards. It may be there are a lotof other people around the industry that still have got

a drawer full of old business cards that can recall some of these people. Some of them, you don't even remember their names anymore.

I remember there was one old guy that worked for Murray Turgethen. He made those outboard engines. He used to pester me all the time for the CUSS I or something or other, to self-propel that thing using his outboard engines. The guy died six months before we ever decided to do it with the CUSS I for that Mohole project. And now, the whole industry is gone. All the dynamic positioning. This is what this guy was selling. I don't remember his name.

TP: The guy I interviewed before you was Billy Pugh, who developed the safety . . . the personnel transfer .

RCC: Oh, sure! Yes. That used to be a horrible problem. Bringing those ships alongside each other and trying to build fenders to keep them out there for a while. The supply boats were so flimsy that that wasn't too bad, you know; we could put some decent steel on the side of the ship. And then, the supply boat manufacturer started making their boats heavier and they started . . . I mean, it was always a continuous problem, trying to get a fender or transfer system on it.

TP: Yes.

RCC: Looking at some of your literature, another one that I saw in there that I hadn't seen recognition of yet was underwater television.

TP: I don't know when that is coming. I was surprised to learn that you were doing it so early.

RCC: Oh, yes. We had probably the first underwater television system going outside of the British. The British had used a big studio image orthicon kind of camera, chasing down their jets, the comets. Do you remember the British comets used to fail, fuselage kind of part? So, they used some underwater televisions using those image orthicon things. But we started using the little . . . I guess you've still got a neck camera here . . . vidicon tubes in there.

There is an outfit down in San Diego called K Lab which was turning out cameras. They were smaller than the one up there but not much. Using one inch vidicon in them. And they had no cases or anything for them. These were for surveillance kind of things and banks and whatnot. They had a guy there by the name of John Day who was the patent holder for the vidicon out of RCA. Worked for K

Lab. So, we bought a couple of these things and we made a case for them which was . . . you couldn't even lift the darned thing. It was made out of pressure heads and had big old lens on the front end of it.

You couldn't find cable. I mean, there wasn't any decent underwater cable made in those days, and connectors, there weren't any connectors. We fought that problem with Canon and a few other people who made connectors and tried to make them waterproof so you could go down in hundreds of feet of water. We finally gave up. We started using . . . we went back and bought just plain old vinyl jacketed studio kind of cable - this grey stuff that was all sort of lumpy. We'd string it inside of one inch stainless steel hydraulic hose, every 50 feet a coupling. And then, the bottom thread down there was nothing but a pipe thread which we knew how to make a pipe thread watertight. At the top end, we put a packing glan and put a little side fixture and we put nitrogen on the hose so that the hose always was overpressured higher than the water pressure outside. Never had any trouble . . . this horrible bulking thing, God, it was horrible to handle and every time something broke, you had to string out all the hose and spaghetti it, but it worked. It worked fine.

So, we started that in 1953 or 1954. The guy who eventually really brought it into the oil industry was a guy by the name of Joe Granville. If they ever get around to giving anybody credit for it. And Joe died here a few years ago. But he built a company called Subsea Systems, I think it was. Joe Granville. Joe was a guy with more money than he knew what to do with and he came to me when he had heard we had a underwater television system. And he owned about a 90 feet motor sailer and was interested in archaeology. And so, he wanted one of these things to go looking on the bottom. I wasn't interested in doing anything for him, so we sent him down to K Lab down there and he finally clooged up a system he had on this motor sailer and he got so intrigued with this whole underwater television business that he started this company, and he is the one who really spread it all over the well industry.

TP: I should think about nominating him.

RCC: Well, check it out. There may be some other people who have different ideas of where it came from.

TP: Well, this has been fascinating. Is there anything else you want to add? I think we are running up against the time right now.

RCC: Oh, you could talk for hours about the crazy business, you know.

TP: Yes, well, this has been wonderful.

RCC: You asked me about anecdotes. Talk about lifting up on the kelly while you are making hole, and we ran into that for Shell on Alaska and Cook Inlet. Of course, you know, we would drill with bumper subs and you try to keep the sub in middle stroke and the driller is always fighting you, putting too much weight on the bidder lifting off. And we had problems with the poor old drillers. They couldn't keep the weight off the bit and just leave the collar weight, not putting the pipe weight onto it. And what was happening was we discovered was that it was hard rock drilling, so it was slow. Well, the tide was falling out faster than the bit was going down. I mean, there is 30 feet tidal change. So the poor old rig was going down close to the ocean floor and the hole was being made. So we had to make a little computer kind of thing that the driller could watch where he was in terms of the rate of one or the other and feed the pipe on.

TP: A lot of stories have come out of the Cook Inlet with those . . . Brown & Root lost a platform. They had to chase it around . . .

RCC: They did. George Ferris, or something like that, wasn't it?

TP: Yes. They were trying to rope it. I guess the headline was, "Texas Cowboy is Trying to Rope a Platform."

RCC: That was the old George Ferris. They changed its name. They used to call it something else. That is actually about where the idea for the Glomar Explorer came from, as to how to get that thing, was work that was done on there with the Ferris for laying sewer pipe off of the California coast, just off the LA airport there.

Macco . . . we had a contract for laying, I don't know how many miles . . . about 15 feet diameter concrete sewer plant. And we used the Ferris. And the kind of frame that we lowered the pipe on and adjusted and moved it around was essentially what we used on a much bigger scale on the Explorer.

TP: Well, I think we have to come to a close, but it has been a pleasure talking to you.

THE END

Offshore Energy Center - Oral History Project

Index for Interview with R. Curtis Crooke
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